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Recent developments in high temperature calorimetry

A variety of high temperature calorimetric techniques have recently advanced for application to refractory oxides and related materials. These include improvements in oxide melt solution calorimetry at temperatures up to 1500 °C, differential thermal analysis to 2500 °C, and “drop-n-catch” calorimetry to 3000 °C. Used together, these methods enable one to draw a more complete picture of phase stability, order-disorder, melting and crystallization, and dissolution of solids in silicate melts. These methods will be illustrated using examples from rare earth materials chemistry. New developments in the calorimetry of chalcogenides and mixed anion materials will also be presented. The synergy among calorimetry, first principles calculations and computations of phase diagrams will be emphasized.